INSTRUCTION MANUAL

FOR

X-Y DIGITAL PLOTTER

(A3 Size)

INTRODUCTION

Thank you very much for your purchase of our X−Y, plotter.For correct operation,please read the "Instruction Manual".

CONTENTS

1. Standard Accessories ········ 2
2. Precautions on Operation ········ 3
3. Names and Functions of Each Part ········ 4
4. Preparation for plotting ········ 6
5. Interface ········ 17
6. Example with Computer Communication (RS−232C) ········ 21
7. Command ········ 23
8. Specifications ········ 27

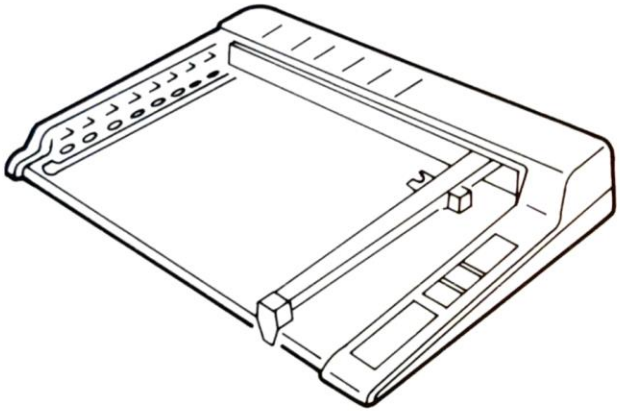
1 Standard Accessories

Unpack and verify that the following standard accessories are supplied.

1	X-Y plotter (main unit)	1 pc.
2	Power Cord	1 pc.
3	Fiber pen(water type,8colors per set)	1 set
4	Magnet	1 pc.
5	Soft cover	1 pc.
6	Instruction manual	1 copy

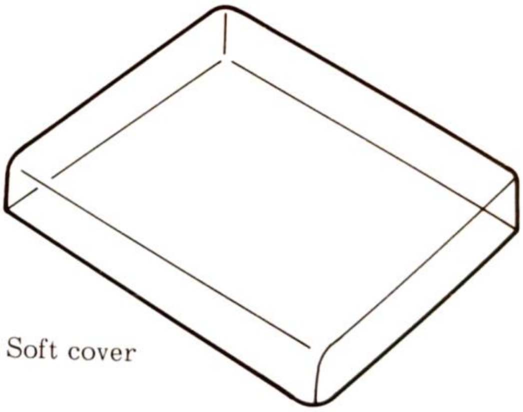
＊Magnet ④ is not furnished to Electrostatic Paper Holding type.

① X−Y plotter (main unit)



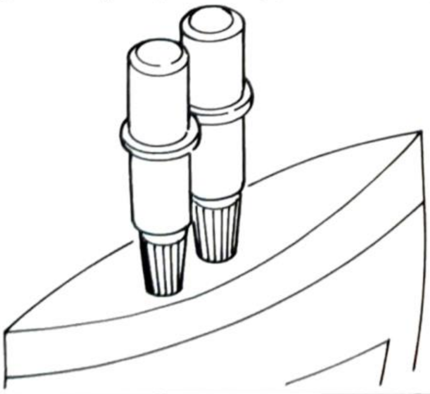
④ Magnet

② Power cord



⑤ Soft cover

③ Fiber pen(water type,8 colors per set)



⑥ Instruction munual

If any of the above items is missing or damaged, please inform your dealer of this fact immedeately.

2 Precautions on Operation

Observe the following precautions for safe operation.

1) Avoid operating or storing the X−Y plotter in a place exposed to direct sunlight or near a device generating heat.
2) Avoid operating the X−Y plotter in a dusty or humid place.
3) Avoid operating the X−Y plotter in a place with extreme mechanical vibration or electrical noise.
4) Don't put heavy objects on the X−Y plotter or lean on your arm or elbow on it.
5) Install the X−Y plotter in as flat a place as possible.
6) Don't put a magnetic disc, card, or tape on the X−Y plotter, or these magnetic products may malfunction.
7) Connect the power cable and the interface cable securely. A poor connection may cause a malfunction.
8) Disconnect the power cable when the X−Y plotter is not used for a long time.
9) Auto pen cap is provided to prevent drying of the pen point. After operation,remove the pen from the pen arm and cap it.
10) Don't lubricate mechanical parts.This may cause problems.
11) Use alcohol to remove ink stains from the paper setting table. Never use an organic solvent such as a thinner.

Special cautions for Electrostatic Paper Holding type.

1) Electrostatic absorption plate is fitted with electrodes. So, sharp or edged devices should not be used on the plate in order to protect the built−in electrodes from being damaged. Putting heavy items on the plate should also be restrained.
2) Surface of the plastic plate should be free from any dirts, otherwise absorption power will weaken.

   If the surface becomes dirty, sweep a brush over the plate and wipe the dirt off with a wet cloth.

   Water or alcohol is recommended to wet the cloth. Organic solvent like thinner, however, should not be used to prevent the plastic plate from deterioration.
3) When transparency film is used as plotting paper, please note it is not so suitable for electrostatic absorption.

3 Names and Functions of Each Part

1) Names of each part

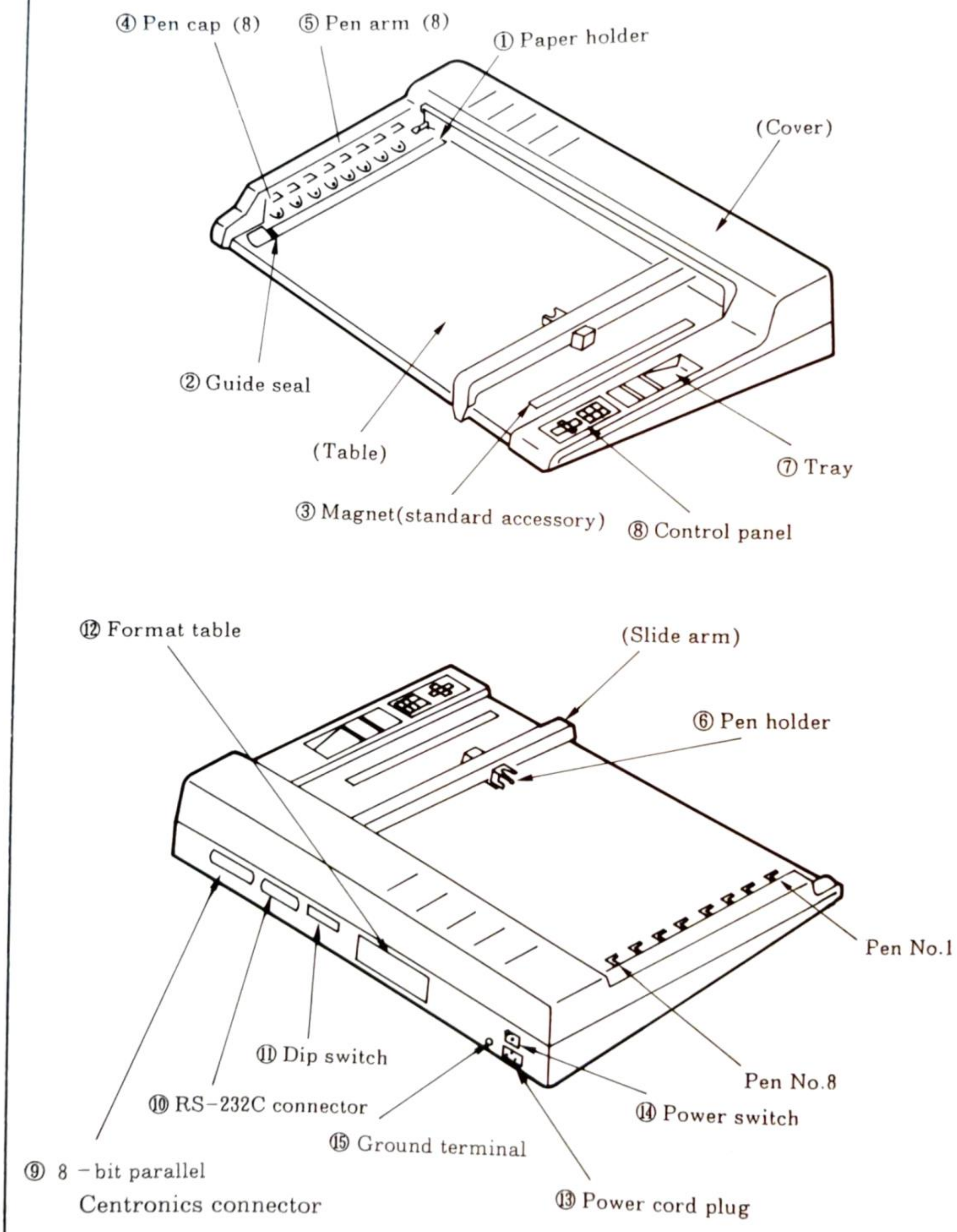


Fig.3-1 Names of each part

2) Functions of each part

1 Paper holder
This is used to fix the left side of the paper.

2 Guide seal
This is used as a reference for positioning the bottom edge of the paper.

3 Magnet
A standard accessory,used to fix the right side of the paper.

4 Pen cap
An auto pen cap to prevent drying of the pen point during operation.

5 Pen arm
Set a pen on this arm. The foremost pen is pen No. 1, and the rearmost pen is pen No.8.

6 Pen holder
Set a pen removed from the pen arm in this holder for plotting by moving on a sheet of paper.

7 Tray
This is used to store caps removed from pens.

8 Control panel
This is used for manual external operation.

9 8-bit parallel Centronics connector

10 RS-232C connector
These are the interface connectors for external input.

11 Dip switch
This is used for setting serial communication format and character font.

12 Format table
This is used for setting the dip switch.

13 Power cord plug
This is a power cord connection terminal.

14 Power switch
This is used to turn ON and OFF the X-Y plotter.

15 Ground terminal
This is used to connect a ground cord.

*Paper holder ① and Magnet ③ are not furnished to Electrostatic Paper Holding type.

4 Preparation for Plotting

Prepare for plotting according to the following procedure.

1) Installation

Install the X-Y plotter in as flat a place as possible.

2) Paper setting

(1) Magnetic Paper Holding type.

Raise the paper holder, and insert the left edge of the sheet of paper. The left edge meets the paper guide. At this time, the bottom edge of the paper should be even along the guide rail. Secure the right side with a magnet.

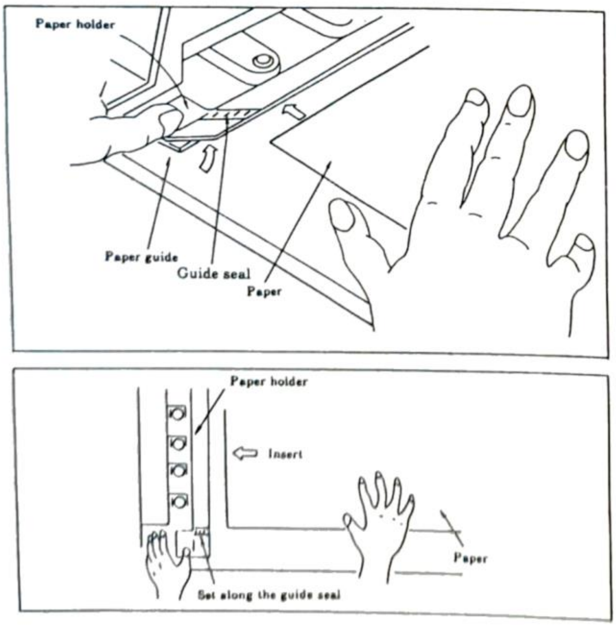
(2) Electrostatic Paper Holding type.

Push PAPER HOLD key on the control panel and confirm if P. HOLD lamp is on. This light shows that the function of electrostatic paperhold works effectively.

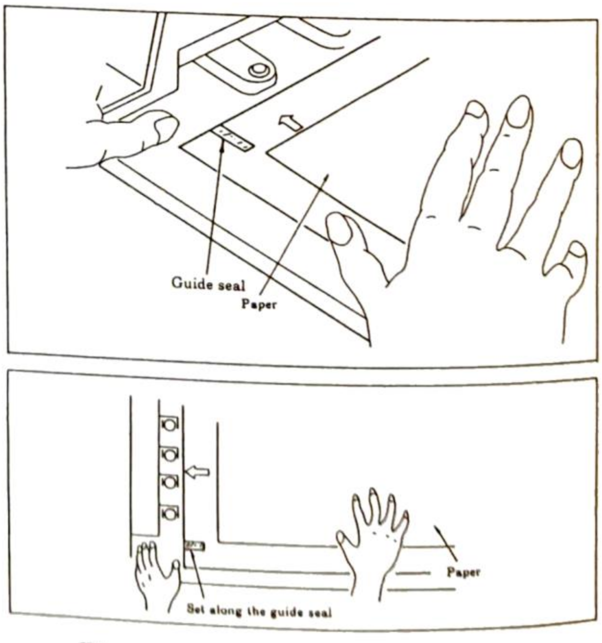
Paper should be so set that its left edge shall fit to the left end of the plate and its bottom edge to the guide seal. In this case, a binding margin of approx. 12mm width is reserved on the left edge of paper, and this marginal space is free from the effect of electrostatic absorption.

If the paper waves on the plate, make it even by the palm of hand.

By pushing PAPER HOLD key again, P. HOLD lamp is turned off, and absorption is released.



Magnetic Paper Holding type.



Electrostatic Paper Holding type.

3) Paper size and plotting area

ANSI/A, ANSI/B, ISO/A4 and ISO/A3 sizes are usable in this plotter. Use the dip switch on the rear panel for setting the plotting area for each size of paper. Refer to 8) Setting the dip switch.

Set each size of paper according to 2) . The plotting area and ziro point position are different for each size of paper. Therefore, set the same paper size as the paper to be used.

Table 4 − 3 shows the relationship between the size of paper set/selected and the plotting area.

Dip Switch setting		Paper size selected (X×Y)	Plotting area (X×Y)
SW 1 −8	SW 1 −9		
ON	ON	ANSI/A 11×8.5 inches	266.800×199.050 mm
ON	OFF	ANSI/B 17×11 inches	416.000×260.200 mm
OFF	ON	ISO/A4 297×210 mm	277.000×193.000 mm
OFF	OFF	ISO/A3 420×297 mm	404.000×277.000 mm

Table 4 − 3 Paper size and plotting area

The table shows the relationship between the paper size, the plotting area, and the zero point.

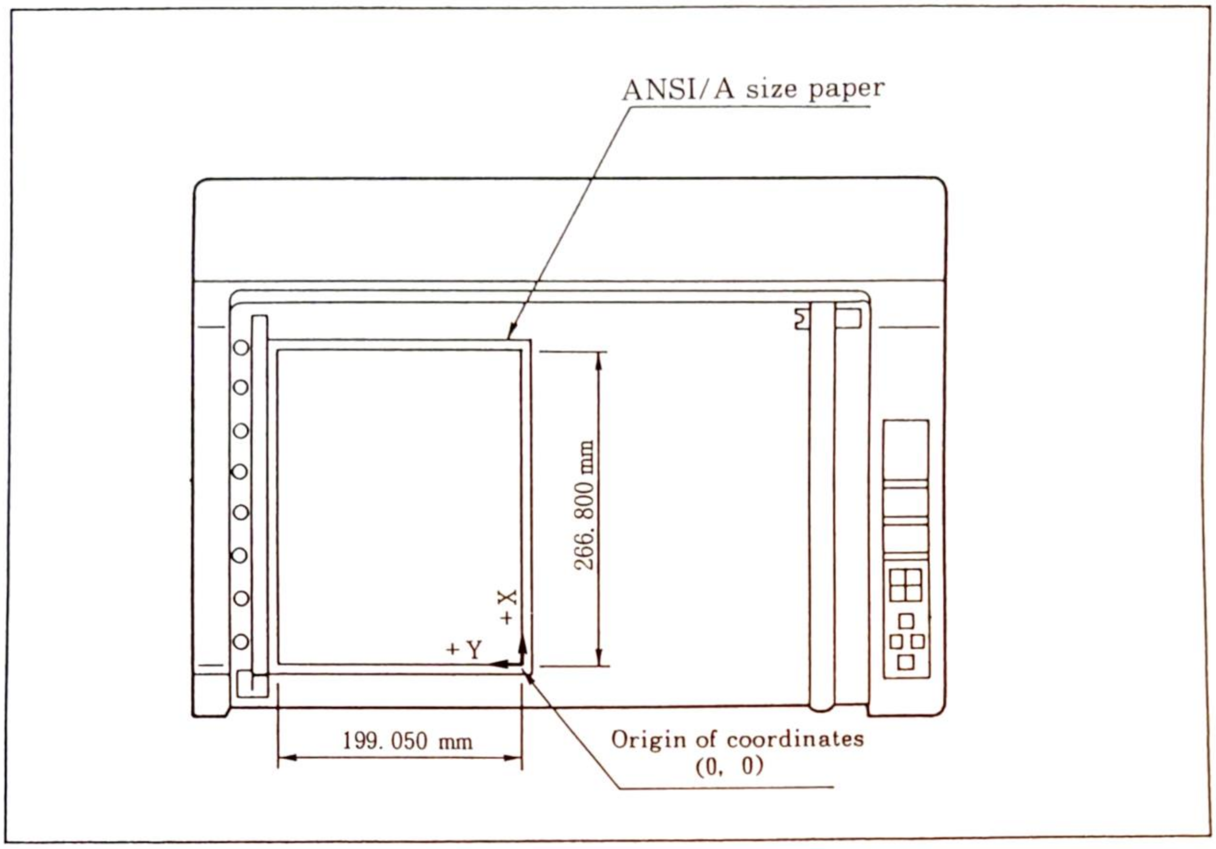


Fig.4−4 Coordinate origin and plotting area for ANSI/A size paper

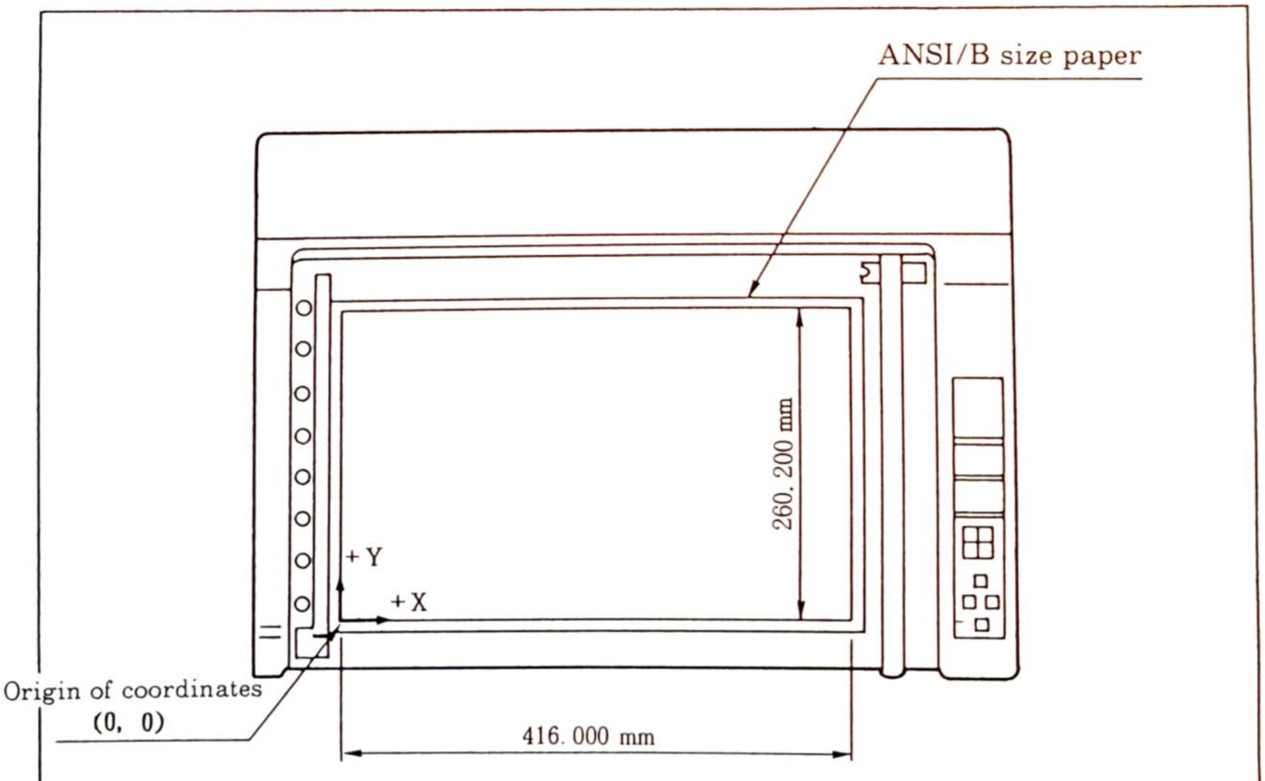


Fig.4−5 Coordinate origin and plotting area for ANSI/B size paper

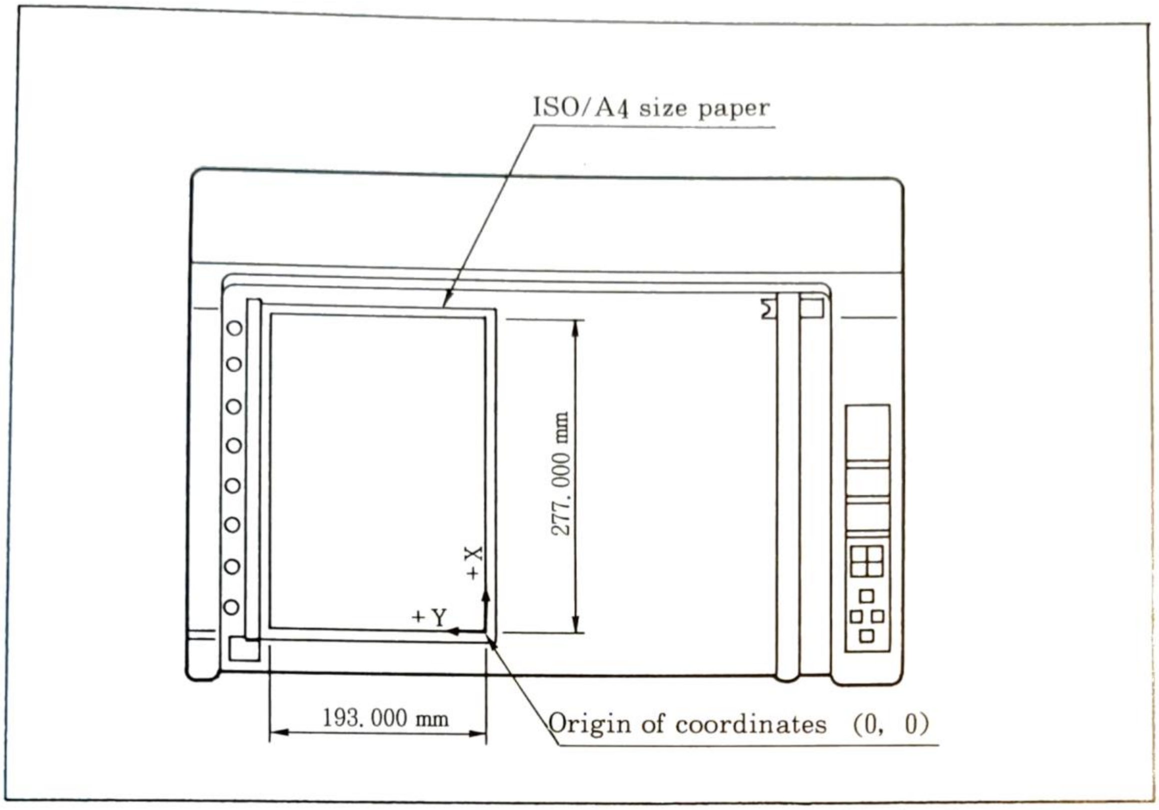


Fig.4-6 Coordinate origin and plotting area for ISO/A4 size paper

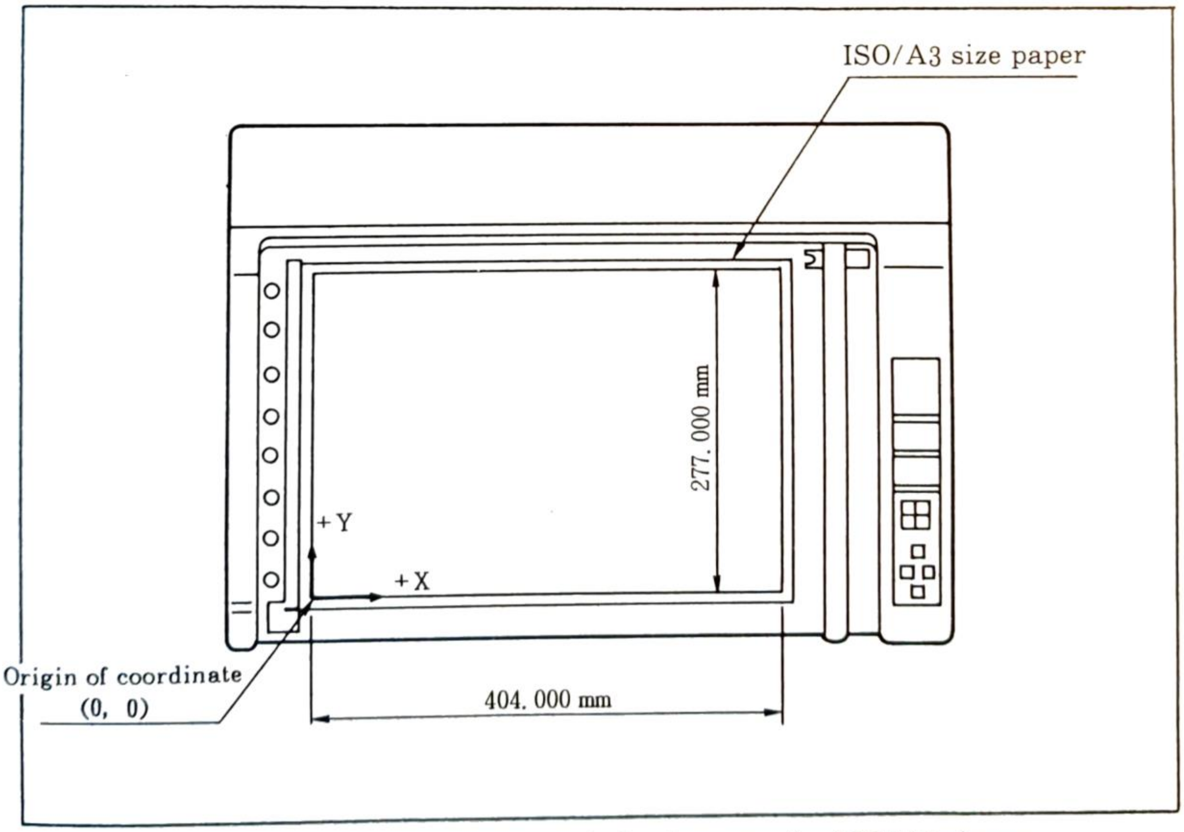


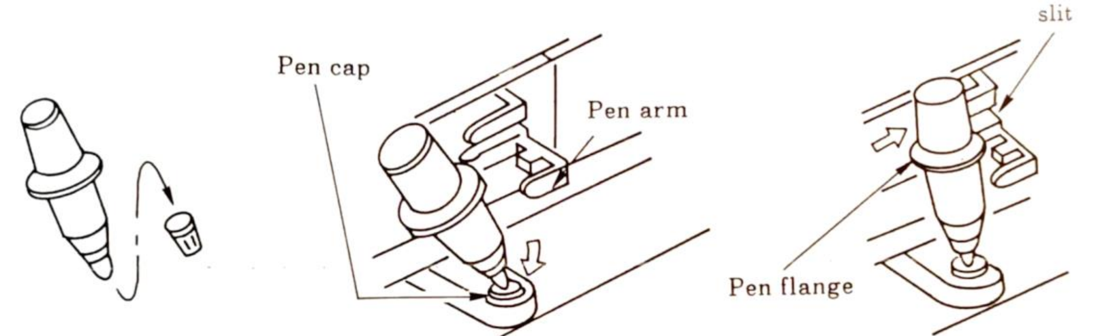
Fig.4-7 Coordinate origin and plotting area for ISO/A3 size paper

4) Kind of paper

Coated paper,fine quality paper, and measuring paper are usable. We recommend coated paper that produces minimal ink blurring. Use an oil pen when using a film sheet for an OHP(Overhead Projector).

5) Pen setting

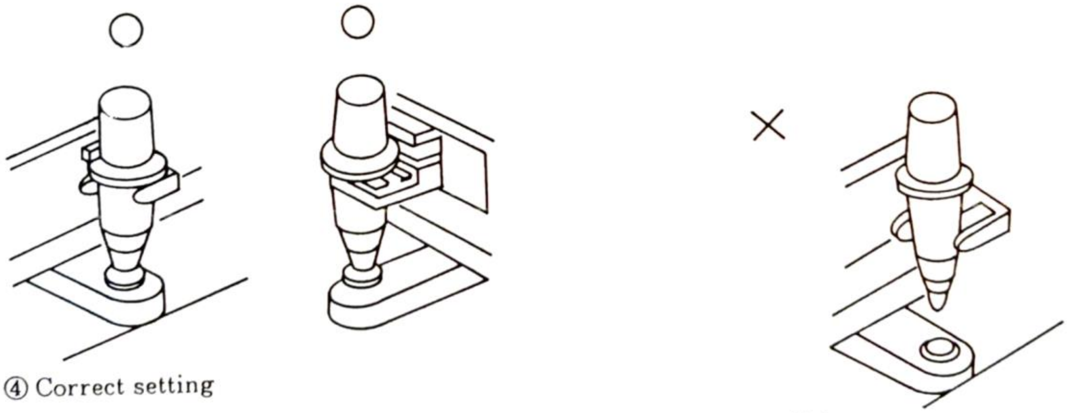
Remove the cap,and insert the pen into the pen arm. Insert the pen point into the pen cap,and insert the flange into the pen arm slit. If the pen is inerrorly set,the pen can't be exchanged or the pen point may be damaged.



① Remove the cap.

② Insert the pen point into the pen cap.

③ Insert the pen flange into the pen arm slit.



④ Correct setting

⑤ Incorrect setting

Fig.4－8 Pen setting

The removed cap should be stored or put in the tray so it is not lost. When the X－Y plotter is not used for a long time,be sure to remove the pen from the pen arm and put the cap on it.

6) Power connection and operation

1 Verify that the power switch is off. Insert the power cable into the power cord plug,and connect the other end of the power cable to the AC outlet.

2 Connect the interface connector. For each format setting,refer to 5 "Interface".

3 Set the paper, and set the pens.

At this time, don't set a pen in the pen holder. Otherwise, the pen sensor functions after the power is turned ON,and the X−Y plotter produces an error with the ALARM lamp flashing red on the control panel. If this conditon occurs,return the pen to the unused pen arm and turn on the power again.

4 When the power switch is turned ON,the POWER lamp is lit on the control panel and the pen holder moves until detecting the limit positions in the X and Y directions.

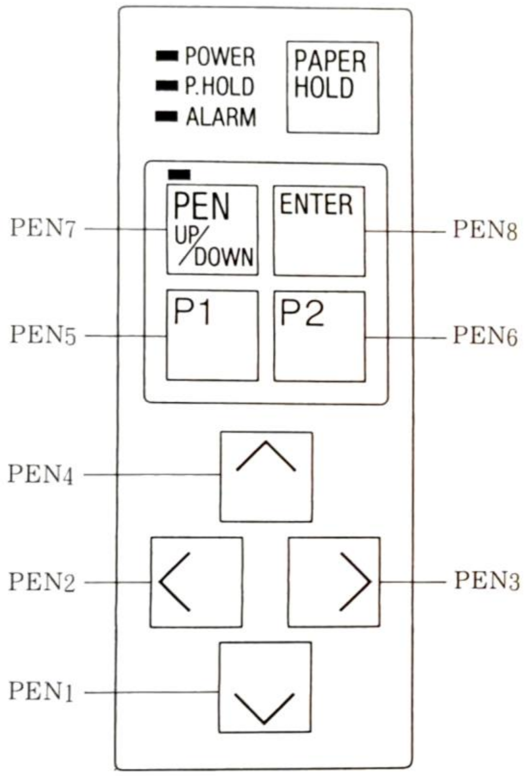
5 The operation can be checked from the control panel. Details are described in the next section.

6 When the plotting command is entered, the plotting is started with the specified pen.

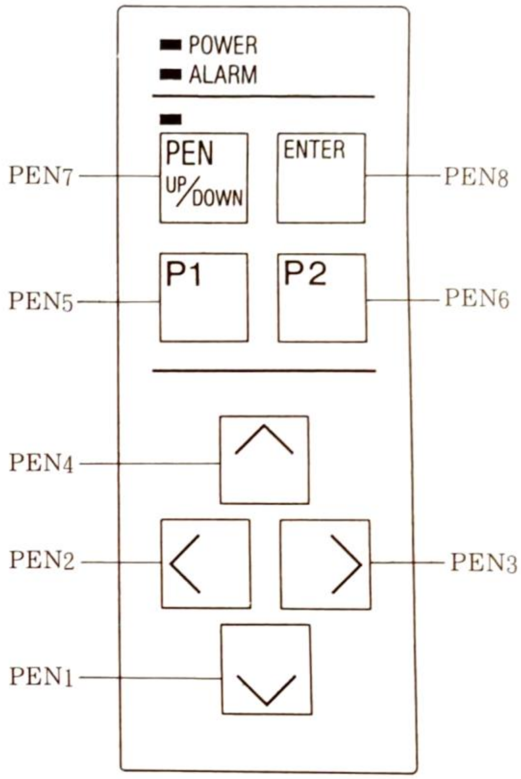
When neither the plotting command nor the command from the control panel is entered for 10 seconds, the pen is automatically stored in the pen arm.

7) Description of the control panel

The switches and lamps on the control panel and their functions are described.



Electrostatic Paper Holding type.



Magnetic Paper Holding type.

① PEN UP/ DOWN PEN UP/DOWN key and lamp

- When this key is pressed, the pen state(up or down)is inverted.
- When this key is pressed during program execution, the same effect as execution of a"PU"or"PD"command can be obtained.
- The lamp flashes green when the pen is moved down.

②

ENTER KEY

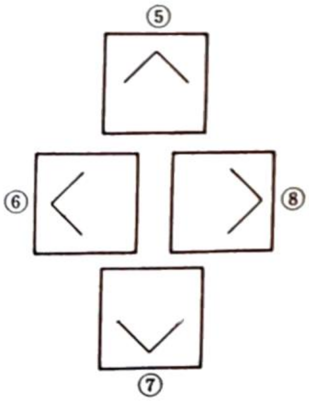
- When the "DP"command is received, the ALARM lamp flickers. When the pen is moved to a desired point and the ENTER Key is pressed, the ALARM lamp stops flickering and the coordinate value of that point and the pen state are stored in the output buffer of the X−Y plotter. This data is sent to the computer when the "OD"command is received.
- When the P1 or P2 key is pressed together with the ENTER key,the current pen position is defined as a new scaling point P1 or P2. P2 moves with P1.
- When the > key is pressed together with the ENTER key,the coordinate system is rotated 90°.
- When the PEN UP/DOWN key is pressed together with the ENTER key,all functions are reset to the initial state.

③

④

P1 , P2 Key

- When the P1 or P2 key is pressed, the pen rises and moves to the scaling point P1 or P2 set then.
- When the ENTER key is pressed together with the P1 or P2 key, the current pen position is set as a new scaling point P1 or P2



Pen move key

- These four keys are used to move the pen within the plotting limit. The pen moves in the direction of the arrow on the pressed key.
- When two adjacent keys are simultaneously pressed, the pen moves in the resultant direction (45°) of the two arrows of these keys.
- When the key is pressed, the pen moves first at a low speed for 1.5 seconds and then, it moves at a high speed (4 times faster than the low speed).

- Pause function.

  By pressing any of the arrow keys while program is executed, the operation stops temporarily and the pen returns to the pen-up position.
  To release the pause mode, press any of the arrow keys again. While the plotter remains in the pause mode, the MANUAL RESET is available.

⑨ ▭ POWER lamp

- This turns red when the power is turned ON.

⑩ ▭ ALARM lamp

- This flashes red when an error occurs in the plotter. It indicates detection of an I/O error not set in the error mask or an error concerning the command.
- The lamp flickers during digitizing after receiving the "DP"command and until the ENTER key is pressed.

⑪ PAPER HOLD

- Pushing this key turns on the PAPER HOLD lamp and puts electrostatic paper hold into operation. Pushing this again turns off the PAPER HOLD lamp and releases electrostatic paper hold.

⑫ ▭ P.HOLD lamp

- While this lamp is on, electrostatic paper hold works. Pushing the PAPER HOLD key turns on this lamp and pushing the key again turns it off.

Pen selection

While the plotter is not in operation, a pen can be selected by manual operation.

Press the < key while depressing the ENTER key.
When ALARM indicator starts blinking, release both keys.
Then press the control panel key corresponding to the number of the pen to be used. For example, pressing ∨ key selects pen 1. (see Figure in page 12).

If the selected pen is not used within approx. 6 seconds, it is automatically returned to its pen stall to prevent it from drying.

8) Setting the dip switch

Two dip switches are provided on the rear panel. Set them appropriately before turning on the power switch.

The SW1 determines the communication method of the RS-232C interface. The SW2 determines the default value of the character font. The upper side is "ON", the lower side is "OFF", and the left side is No.1. The setting details are as shown below.

〈SW1〉

Switch No.	Item	ON	OFF	At shipping from factory
1 ~ 3	Baud rate setting	See below		9,600 baud
4	Stop bit	2	1	1
5	Parity	Yes	No	No
6		Even	Odd	Odd
7	Buffer size	5K bytes	1K byte	1K byte
8	Paper size	ANSI(US)	ISO(MET)	ISO
9		A4/A	A3/B	A3/B
10	Unused	–	–	–

Baud rate	No.1	No.2	No.3
150	ON	ON	ON
300	OFF	ON	ON
600	ON	OFF	ON
1200	OFF	OFF	ON
2400	ON	ON	OFF
4800	OFF	ON	OFF
9600	ON	OFF	OFF

No. 1 ～ 3	Set the baud rate.
No. 4	Select whether the stop bit is 1 or 2 bits.
No. 5	Select whether or not the parity bit exists.
No. 6	Select even or odd partity when the parity bit exists(No.5) .
No. 7	Unused
No. 8	Used in combination with switch No.9 for setting the paper size to be used. The paper size is selectable from the following four types.(Refer to page 7.)

ANSI(US)/A (11×8.5 inches)
ANSI(US)/B (17×11 inches)
ISO(MET)/A 4 (297×210mm)
ISO(MET)/A 3 (420×297mm)

This switch is used to select ANSI(US)or ISO(MET).

No. 9	Used to select A3/B or A4/A of the four paper sizes listed above (No.8). (Refer to page 7.)
No.10	Unused

〈SW 2〉

Font	No.1	No.2	No.3	No.4
Set 0 (ANSI ASCII)	ON	ON	ON	ON
Set 6 (JIS ASCII)	OFF	ON	ON	ON
Set 8 (katakana)	ON	OFF	ON	ON
Set 9 (ISO IRV)	OFF	OFF	ON	ON
Set 30 (ISO Swedish)	ON	ON	OFF	ON
Set 31 (ISO Swedish For Names)	OFF	ON	OFF	ON
Set 32 (ISO Norway,Version1)	ON	OFF	OFF	ON
Set 33 (ISO German)	OFF	OFF	OFF	ON
Set 34 (ISO French)	ON	ON	ON	OFF
Set 35 (ISO United Kingdom)	OFF	ON	ON	OFF
Set 36 (ISO Italian)	ON	OFF	ON	OFF
Set 37 (ISO Spanish)	OFF	OFF	ON	OFF
Set 38 (ISO Portuguese)	ON	ON	OFF	OFF
Set 39 (ISO Norway,Version 2)	OFF	ON	OFF	OFF

5 Interface

1) Interface switching

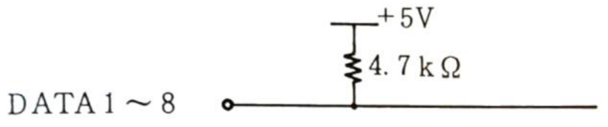
Two interfaces are provided, an 8-bit parallel Centronics interface and RS-232C interface. These interfaces are automatically switched. The interface that receives a signal first after the power is turned on is selected.

2) 8-bit parallel interface (conformable to Centronics)

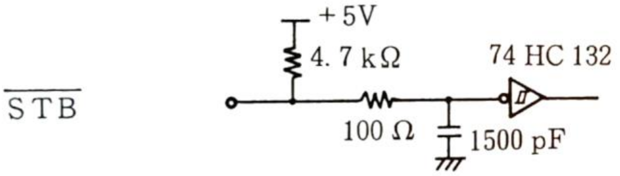
① Control signal

$\overline{\mathrm{STB}}$ BUSY $\overline{\mathrm{ACK}}$ $\overline{\mathrm{ERROR}}$

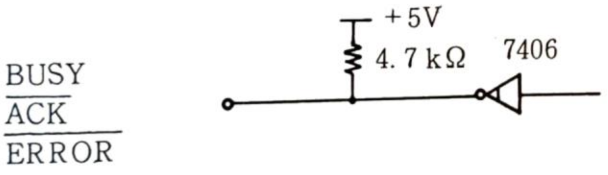
② Input/output circuit configuration and input/output condition



Input/output logic level
"1" = 2.0 ~ 5.0 V
"0" = 0 ~ 0.8 V

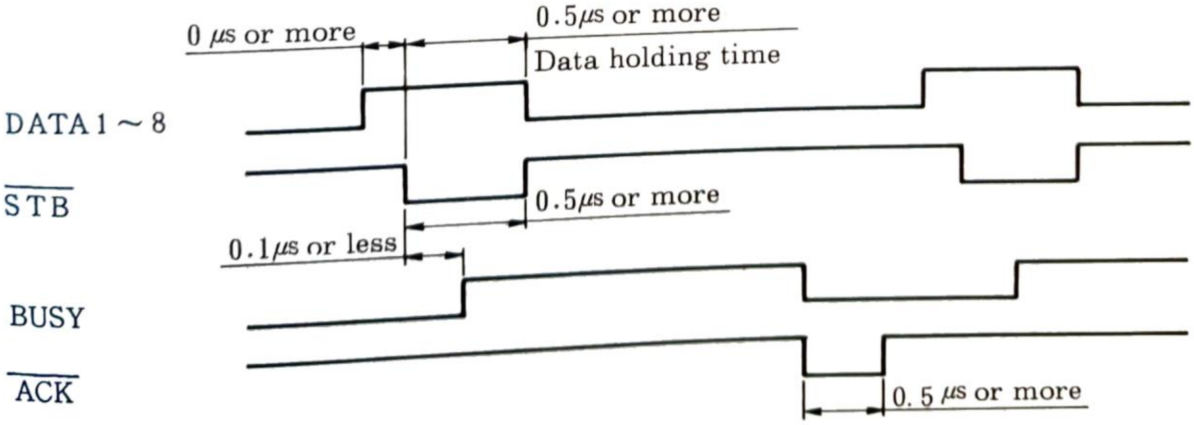


"1" = 3.15 ~ 5.0 V
"0" = 0 ~ 1.35 V



Output logic level
"1" = 2.7 ~ 5.0 V
"0" = 0 ~ 0.4 V

③ Timing chart



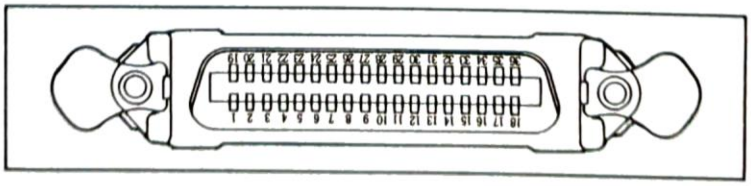
④ Input connector

Cable side : DDK 57－30360 or the equivalent

Main unit side : DDK 57-40360 or the equivalent

⑤ Connector signals and functions

Pin	Signal	Direction	Function
1	$\overline{\text{STB}}$	Input	Strobe pulse, Pulse width of 0. 5μs is required. Usually "HIGH" in input, and takes in the data at the trainling edge.
2	DATA 1	Input	8－bit data signal. HIGH level at logical "1" , and LOW at "0" .
3	DATA 2	Input	
4	DATA 3	Input	
5	DATA 4	Input	
6	DATA 5	Input	
7	DATA 6	Input	
8	DATA 7	Input	
9	DATA 8	Input	
10	$\overline{\text{ACK}}$	Output	Acknowledge output. Pulse width is about 0. 5μs. This indicates that the data has been received.
11	BUSY	Output	When this signal is HIGH, it indicates that the plotter can't receive a signal. This signal is HIGH in the following conditions: (1) Data input period (2) Under plotting
12	GND	–	
13	–	–	PULL UP to 5 V
14	–	–	
15	–	–	
16	GND		
17	F.G.		
18	5 V	–	Inhibited from use.
19 ~ 30	GND	–	GND for returning to #1~#11.
31	–	–	
32	$\overline{\text{ERROR}}$	Output	When this signal is LOW,it indicates that the plotter is in an error condition.
33	GND	–	
34	–	–	
35	–	–	
36	–	–	



3) RS-232C Interface

① Synchronizing system
Start-stop system

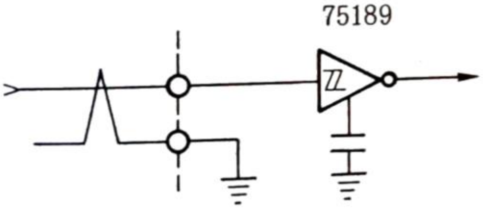
② Communication speed(baud rate)
150, 300, 600, 1200, 2400, 4800, 9600

③ Communication format
Start bit:1 bit
Data:8-bit or 7-bit
Parity:Even,odd,or no parity
Stop bit:1 or 2 bits

④ Buffer memory size
1024 bytes/5120 bytes
(Convertible by Dip Switch).

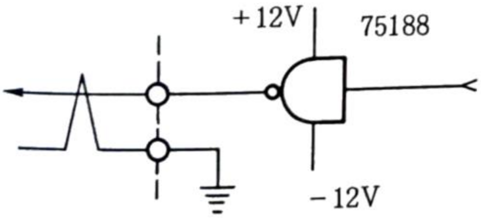
⑤ Input/output circuit configuration and input/output characteristics

- RXD,CTS,DSR



ON (SPACE) : + 5 ~ + 12V(typ.)…"0"
OFF (MARK) : − 5 ~ − 12V(typ.)…"1"

- TXD,RTS,DTR



ON (SPACE) : + 5 ~ + 8 V(typ.)…"0"
OFF (MARK) : − 5 ~ − 8 V(typ.)…"1"

⑥ Input/output connector

- Cable side
  EIA standard 25-pin plug type (JAE DB-25P or the equivalent)
- Plotter side
  EIA standard 25-pin socket type (JAB DB 25S or the equivalent)

⑦ Connector signals and functions

Pin	Signal	Signal name	Direction	Function
1	FG	Frame ground	–	Grounding for safety
2	TXD	Transmission data	Output	Serial transmission data sends an X–parameter
3	RXD	Receiving data	Input	Serial reseiving data
4	RTS	Request to send	Output	Usually ON (+potential)
5	CTS	Clear to send	Input	Permits transmission from the plotter
6	DSR	Data set ready	Input	–
7	SG	Signal ground	–	–
20	DTR	Data terminal ready	Output	Signal for DTR control

⑧ Handshake mode

The plotter sends the data on buffer capacity to the computer for preventing omission of data due to overflow of the buffer. The data transmission is available in the following four methods, that are switched by the software.

- Hard wire handshake(DTR handshake)

  The computer monitors the output level at pin 20 (DTR) of the RS–232C connector.

DTR signal	Function
ON	Enough buffer capacity remains.
OFF	Little buffer capacity remains.

- Xon–Xoff handshake

  Handshake is executed by sending the Xon and Xoff code on the data line.

X parameter	Function
Xon send	Enough buffer capacity remains.
Xoff send	Little buffer capacity remains.

- ENQ/ACK handshake

  Handshake is executed by the computer inquiring to the plotter about buffer space required for data transmission.
- Software checking handshake

  Handshake is executed by the computer inquiring to the plotter about the resindual buffer capacity.

⑨ Setting the Communication format

Use the dip switch (SW1) on the rear panel to set the data communication condition, baud rate, stop bit, and parity of RS−232C. Refer to 4−8 “Dip switch setting”.

6 Example with Computer Connection (RS−232C)

(1) The following machine is shown here as an example.IBM PC/XT/AT

(2) Cable used and its connection

- For connecting with IBM PC/XT

  Connect as follows using CABLE A as in the figure.

IBM PC/XT ··············CABLE A··············· PLOTTER

- For connecting with IBM AT

  Connect as follows using CABLE A and B as in the figure.

IBM AT ······ CABLE B ······ CABLE A ······ PLOTTER

- Cable connection diagram

CABLE A···Interface cable Model : T−50408

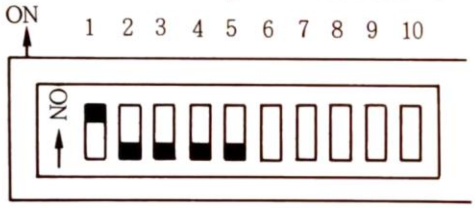
Computer Side (Connector:DSUB−25 S)	Plotter Side (Connector:DSUB−25 P)
1	1
3	2
2	3
6	4
20	5
4	6
7	7
5	20

CABLE B···Interface Cable Model : T−52422 or Standard IBM 9−pin to 25−pin cable

Computer Side (Connector:DSUB−9S)	Plotter Side (Connector:DSUB−25P)
3	2
2	3
7	4
8	5
6	6
5	7
1	8
4	20
9	22

(3) Dip switch setting

Set the dip switches of the plotter as follows :



(4) Communication Verification with Computer

If the following BASIC program is executed and characters are normally plotted,communication verification is completet.

```
10  OPEN"COM 1 :9600,N,8,1,RS,CS65535,DS,CD"AS # 1
20  PRINT # 1,"IN;SPI;PA1000,1000; "
30  PRINT # 1,"LBCONNECTION ALL RIGHT" + CHR $ (3)
40  PRINT # 1,"PA0,0;SP0;"
50  END
```

Running the above program causes the plotter to write "CONNECTION ALL RIGHT"

* If you want to use any software available on the market or your own software to operate the plotter,you must set up the plotter's communicating condition to conform with the settings on the connected computer.

For setting of the plotter's communicating condition, refer to pages 15 and 16 of this manual.

7 Command

	Format	Instruction	Function
AA	X〔i/sd〕, Y〔i/sd〕 Center angle 〔 i 〕 (,Resolution〔 i 〕)	Arc absolute.	This specifies the center point by absolute coordinates,and describes a circular arc.
AR	X〔i/sd〕, Y〔i/sd〕 Center angle 〔 i 〕 (,Resolution〔 i 〕)	Arc relative.	This specifies the center point by relative coordinates,and describes a circular arc.
CA	Character set No.〔 i 〕	Designate alternate set.	This sets an auxiliary character set .
CI	Radius 〔i/sd〕 (,Resolution〔 i 〕)	Circle.	This describes a circle.
CP	Number of characters in horizontal direction〔 d 〕, Number of characters in vertical direction〔 d 〕	Character plot.	This moves the pen by the spoecified number of characters.
CS	Character set No.〔 i 〕	Designate standard set.	This sets the standard character set.
DC		Degitize clear.	This ends the digitize mode.
DF		Set default values.	This sets the standard state.
DI	run 〔 d 〕, rise〔 d 〕	Absolute direction.	This sets the character direction.
DP		Degitize point.	This sets the digitize mode.
DR	run 〔 d 〕, rise〔 d 〕	Relative direction.	This sets the character direction by a relative value.
DT	ASC II code 〔 c 〕	Define label terminator.	This sets the label terminetor.
EA	X〔i/sd〕, Y〔i/sd〕	Edge rectangle absolute.	This describes a square by an absolute coordinate value.
ER	X〔i/sd〕, Y〔i/sd〕	Edge rectangle relative.	This describes a square by a relative coordinate value.
EW	Radius〔i/sd〕, Start point angle 〔 i 〕, Center angle〔 i 〕 (,Resolution〔 i 〕)	Edge Wedge.	This describes a segment.

	Format	Instruction	Function
FT	Type〔 i 〕(, Peating space〔sd〕(, Angle 〔 i 〕))	Fill type.	This specifies the hatching type.
IM	e mask value 〔 i 〕	Input error mask.	This sets the mask byte.
IN		Initialize.	This performs initialization.
IP	P1x〔 i 〕, P1y〔 i 〕, (P2x〔 i 〕, P2y〔 i 〕)	Input P1 and P2.	This specifies the coordinates of scaling points P1 and P2.
IW	X left below〔 i 〕, Y left below〔 i 〕, X right above〔 i 〕, Y right above〔 i 〕	Input window.	This sets the window.
LB	Character string 〔 c 〕	Label ASC II string.	This prints a character string.
LT	Pattern No. 〔 i 〕 (,Pattern length 〔 d 〕)	Designate line type and length	This sets the line type and repeat length.
OA	〔i return〕	Output actual position	This outputs the current physical position.
OC	〔i/sd return〕	Output commanded position.	This outputs the current logical posiition.
OD	〔i return〕	Output Degitize point.	This outputs the coordinates of the degitize point.
OE	〔i return〕	Output error.	This outputs an error status.
OF	〔i return〕	Output factor.	This outputs a factor(the number of plotter units per 1㎜) .
OH	〔i return〕	Output hard−clip limits.	This outputs the maximum plotting area.
OI	〔i return〕	Output identifi - cation.	This outputs the plotter registered number.
OO	〔i return〕	Output options.	This outputs an option parameter.
OP	〔i return〕	Output P1 and P2	This outputs the coordinates of scaling points P1 and P2.

	Format	Instruction	Function
OS	〔i return〕	Output statas.	This outputs a status byte.
OW	〔i return〕	Output window.	This outputs the coordinates of window.
PA	X〔i/sd〕, Y〔i/sd〕 (, ……)	Plot absolute.	This moves the pen by absolute coordinates.
PD	(X〔i/sd〕, Y〔i/sd〕 (, ……))	Pen down.	This moves down the pen.
PR	X〔i/sd〕, Y〔i/sd〕 (, ……)	Plot relative.	This moves the pen by relative coordinates.
PS	Paper size 〔i〕	Paper size.	This changes the paper size.
PT	Pen thickness〔d〕	Pen thickness.	This sets the painting space according to the pen thickness.
PU	(X〔i/sd〕, Y〔i/sd〕 (, ……))	Pen up	This moves the pen up.
RA	X〔i/sd〕, Y〔i/sd〕	Shade rectangle absolute.	This hatches in the specified square by absolute coordinates.
RO	0 or 90 〔i〕	Rotate coordinate system.	This rotates the coordinate system 90°.
RR	X 〔i/sd〕, Y〔i/sd〕	Shade rectangle relative.	This hatches in the specified square by relative coordinates.
SA		Select alternate character set.	This selects an auxiliary character set.
SC	Xmin 〔i〕, Xmax 〔i〕, Ymin 〔i〕, Ymax 〔i〕	Scale.	This sets the scaling mode.
SI	Character width 〔d〕, Character heigh 〔d〕	Absolute character size.	This sets the character size by an absolute value.
SL	tan θ 〔d〕	Absolute character slant (from vertical)	This sets the character inclination.

	Format	Instruction	Function
SM	Character 〔c〕	Symbol mode.	This describes a character at each plotting point.
SP	Pen No. 〔i〕	Select pen.	This selects a desired pen.
SR	Character width 〔d〕, Character height 〔d〕	Relative character size.	This sets the character size by a relative value.
SS		Select standard character set.	This selects the standard character set.
TL	Scale length in positive direction 〔d〕 (,Scale length in negative direction 〔d〕)	Tick length.	This specifies the coordinate axis scale length.
UC	(Pen〔i〕,)X〔d〕, Y〔d〕, Pen〔i〕 (, ……)	User defined character.	This describes the user defined character.
VS	Pen speed 〔d〕	Select velocity.	This sets the pen speed.
WG	Radius 〔i/sd〕, Start point angle 〔i〕, Center angle 〔i〕 (, Resolution〔i〕)	Shade wedge.	This hatches in a sector.
XT		X−axis tick	This describes the X−axis scale.
YT		Y−axis tick	This describes the Y−axis scale.

〔c〕 = Character type

〔d〕 = Real number type (−128.0000～+127.9999)

〔i〕 = Integer type (−32768～+32767)

〔sd〕 = Scaled real number type (−32768.0000～+32767.9999)

8 Specifications

1. Plotting Area(max):	ISO A-3 404mm×277mm or ANSI B 16.38″×10.24″
2. Plotting Speed:	400mm/sec(15.7″ /sec)in each axis
3. Resolution:	0.025mm (0.001″)
4. Plotting Accuracy:	
(Distance accuracy)	less than ±0.3% of plotted distance or 0.1mm(0.004 ″), which ever higher.
(Repetition accuracy)	less than 0.1mm (0.004″)
(Pen change accuracy)	less than 0.2mm (0.008″)
5. Number of Pens:	8
6. Paper Size:	ISO A-3(297mm×420mm) or smaller ANSI B (11″×17″)or smaller
7. Operating Temperature:	5℃ to 35℃(40°F to 95°F)
8. Relative Humidity:	35% to 75%
9. Power Requirements:	(Voltage) AC100 to 120V±10%,50/60Hz or AC220 to 240V±10%,50/60Hz (Power consumption) 60VA max.
10. Dimensions:	610mm(W)×455mm(D)×125mm(H) 24″ (W)×17.9″ (D)×4.9″ (H)
11. Weight (Approx.):	6.5kg(14.6lbs)
12. Interface:	Both CENTRONICS PARALLEL and RS-232C SERIAL are installed as standard.(Automatic Selection)
13. Commands:	SK-GL (56 kinds)(HP-GL*/HP-7475A* compatible)
14. Buffer size :	1K byte／5K bytes (Convertible by Dip Switch)

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